Manual 21- Revision 13
Rules and Procedures for Determination of Generating Capability Changes

Jerry Bell
Resource Adequacy Department
Planning Committee
March 7th, 2019
<table>
<thead>
<tr>
<th>Action Required</th>
<th>Effective Date</th>
<th>Who May Be Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare for testing within temperature bounds</td>
<td>06/01/2019</td>
<td>Generators</td>
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<tr>
<td>Prepare for simultaneous testing</td>
<td>06/01/2022</td>
<td>Generators</td>
</tr>
<tr>
<td>Address potential loss of CIRs</td>
<td>01/01/2025</td>
<td>Wind and solar owners/operators</td>
</tr>
</tbody>
</table>
• New Capacity Interconnection Rights section (Section 1.1)
  – Explains how CIRs are attained, retained and lost
  – Calculation examples

• Section 1.2, Installed Capacity
  – Emphasizes ICAP must be determined based on summer conditions
  – Defines summer conditions (also known as rated conditions)
    • Generator site conditions coincident with the last 15 years’ PJM summer peaks
  – Adds additional details for determining Installed Capacity (Rated ICAP)
• Section 1.3, Testing (new section)
  – Summer Test Period remains June 1st through August 31st
  – Delineates what units must correct for generator site conditions and for what conditions a units test must be corrected
  – Units subject to generator site condition corrections must test when:
    • Actual Dry Bulb Air Temperature is within 20°F of Rated Dry Bulb Temperature
    • Actual Wet Bulb Air Temperature is within 10°F of Rated Wet Bulb Temperature
    • Actual Cooling Body Temperature is within 5°F of Rated Cooling Body Temperature
    • If these conditions cannot be met, testing from July 7th through August 31st can occur without adherence to these parameters as long as the testing start time is 10 am or later and the testing end time is 10 pm or earlier
• Section 2 - Net Capability, reconfigure, and split into Conventional Generators, Capacity Storage Units and Intermittent Units
  – Capacity Storage and Intermittent Units are defined in Manual 18
  – Does not include wind or solar units
• Section 3 (New Section) rules to commence for DY 22/23
  – Simultaneous multiple unit testing for up to ten plants per summer per PJM directive
    • Notifications sent via email before the test period and a minimum 14 day window specified
    • Specific wording to permit extension of the time period for testing if PJM cannot accommodate the testing schedule
  – All Capacity Storage and Intermittent Resources (other than wind and solar) must test all units at a plant simultaneously
• Appendix B, Wind and Solar units, basing the capacity factor calculations on ELCC rather than the average starting DY22/23
  – New wind and solar units (first full year of service in DY22/23) will begin using ELCC Methodology in DY22/23
  – For only wind and solar units that participated in the RPM capacity markets in any summer periods prior to DY22/23, CIR evaluation will be suspended from DY22/23 and DY23/24 until the 4th quarter 2024
  – Notifications of lost CIRs will be communicated to generator owners prior to January 1, 2025
  – These units CIRs will then be adjusted effective June 1, 2025 using the ELCC methodology for DY22/23, DY23/24 and DY24/25.
  – Reuse or sale of any lost CIRs (per section 230.4 of the tariff) due to this change must be communicated to PJM prior to January 1, 2025 and these CIRs must be reused in a new queue project
Calculation of Capacity Values for Wind and Solar Capacity Resources

Patricio Rocha Garrido
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Planning Committee
March 7th, 2019
• PJM is proposing to replace its current wind/solar capacity value calculation with an Effective Load Carrying Capability (ELCC) approach
• ELCC will be calculated for existing and future wind/solar capacity resources scheduled to be in-service by the beginning of the Delivery Year for which a Base Residual Auction is next to be run
• The ELCC runs will use the 10 most recent load, wind and solar 8,760 hourly shapes
  – If 10 years worth of data are not available, all data available will be used
• The ELCC runs will use the capacity model from the most recent Reserve Requirement Study
• Future wind/solar capacity resources will be able to request project-specific capacity credits (provided they supply supporting data). Those requested project-specific capacity credits will be incorporated in the ELCC runs.
• Step 1: Calculate Composite ELCC of wind and solar capacity resources combined
• Step 2: Calculate ELCC of wind resources and solar resources separately
• Step 3: Allocate the Composite ELCC from Step 1 in a prorated manner based on the results from Step 2 to derive the Wind ELCC and Solar ELCC.
• Step 4: Allocate the Wind ELCC and Solar ELCC from Step 3 to existing individual wind and solar units based on the individual unit’s output during the top 10 daily peak load hours in the 10 most recent DYs

• Step 5: Future units will get the class average capacity credit (if they did not request a project-specific capacity credit) or an adjusted version of the project-specific capacity credit (if they did request a project-specific capacity credit)
Step 1: Composite ELCC (2018 RRS Capacity Model, Projected Wind and Solar Nameplate MW for 2022/23 = 19,910 MW)

- The ELCC result indicates that the Capacity Credit of 19,910 MW of wind and solar resources is 21% x 19,910 MW = 4,181 MW
Steps 2 and Step 3: In previous PC meetings, PJM showed that the average ELCC for wind and solar resources analyzed separately are

- Wind: 11.5% or 11.5% x 14,620 = 1,681 MW
- Solar: 42.3% or 42.3% x 5,290 = 2,238 MW

The Composite ELCC is greater than the sum of the two values above: 4,181 MW vs 3,919. If the difference is allocated on a pro rata basis

- Wind ELCC = 1,681 MW + 112 MW = 1,793 MW or 12.3%
- Solar ELCC = 2,238 MW + 150 MW = 2,388 MW or 45.1%

The Wind and Solar ELCCs are then allocated to the individual units based in Steps 4 and 5
M-21 Changes Timeline

- PC First Read – 3/7/2019
- MRC First Read – 3/21/2019
- Request for PC Endorsement – 4/11/2019
- Request for MRC Endorsement – 4/25/2019
- Manual 21, Revision 13, effective date – 5/1/2019
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